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(54) Measuring rate of flow

(57) Apparatus for continuous measuring of feeding liquid or particulate materials, mainly pulverulent dressing agents, comprises a feeder (10), creating a curtain of medium, a guide element (1) for the medium, a signal emitter (2) and a signal receiver (3).

At least two oppositely positioned apertures (13, 14) are arranged in the wall of the guide element. The signal emitter (2) and the signal receiver (3) are arranged outside the guide element remote from the stream of medium and a higher pressure prevails on this side of the guide element than inside the guide element facing the stream of medium.

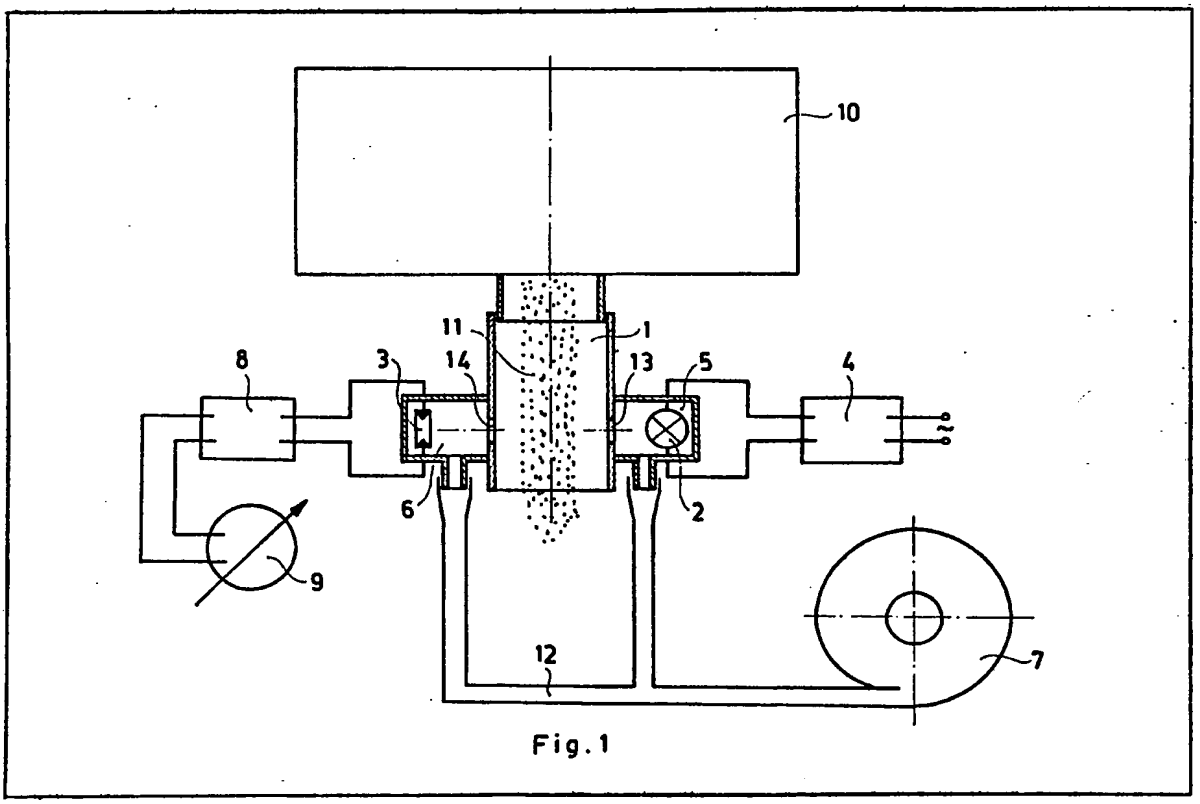

Fig.1

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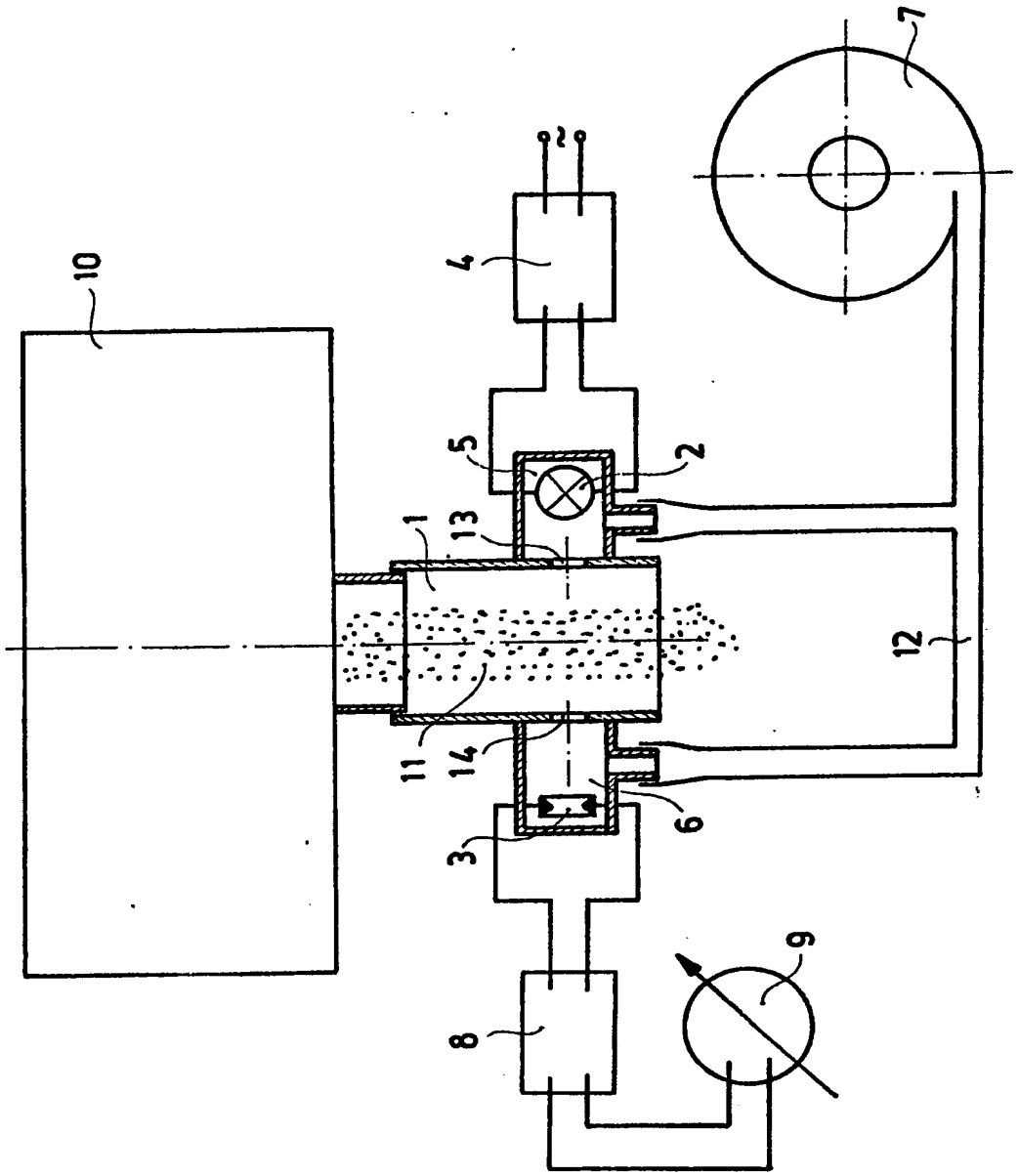

Fig.1

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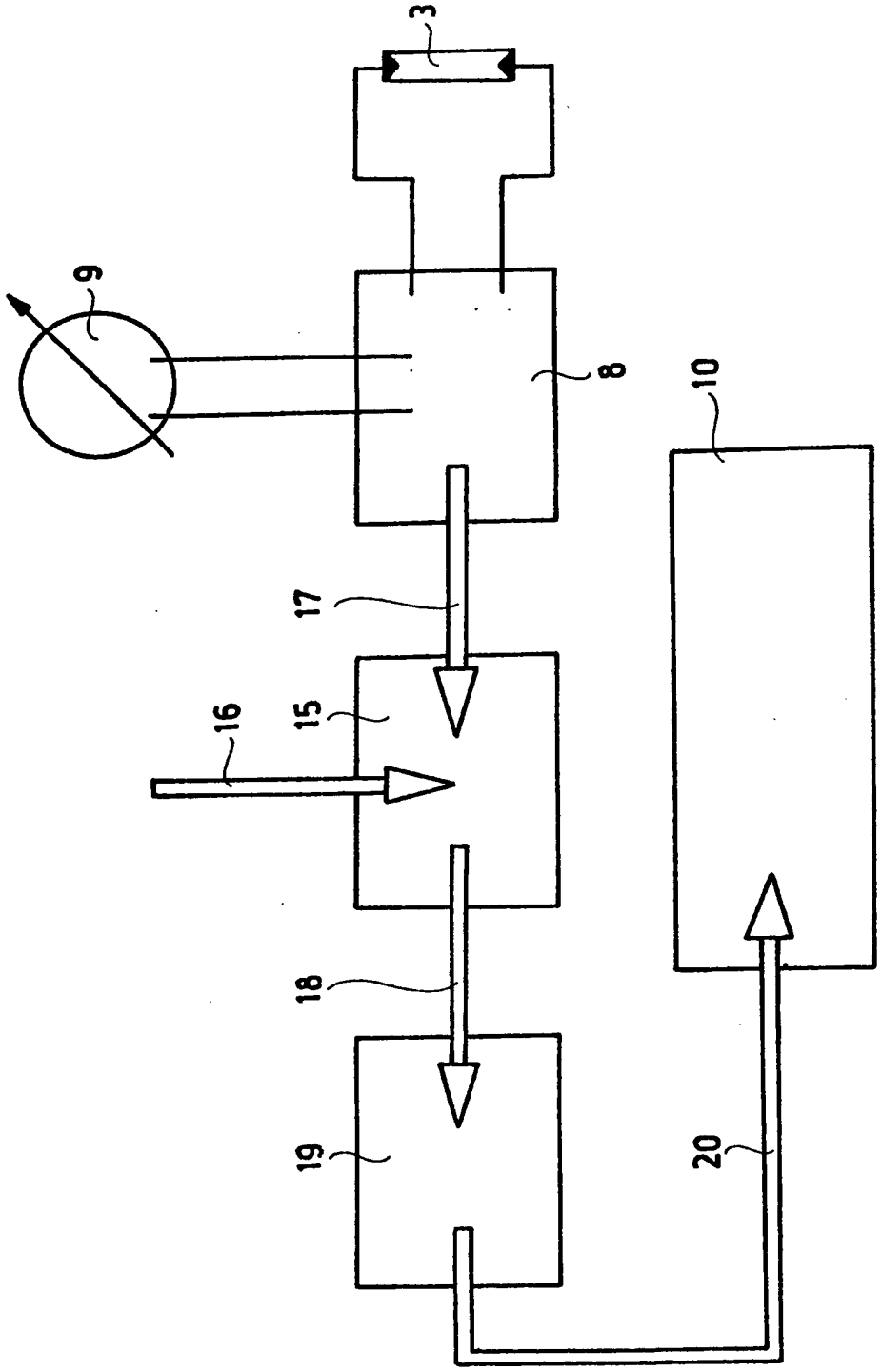

Fig. 2

SPECIFICATION

Apparatus for measuring the rate of feeding of liquids and particulate materials

The invention relates to an apparatus for the continuous measuring of the feed rate of liquids and particulate materials, mainly pulverulent dressing agents, and comprises a feeder forming a curtain of the medium being fed, a guide element for the medium, a signal emitter and a signal receiver.

The invention is described in conjunction with one of its expedient applications, that is the measuring of the feed rate of dressing agents but it will be understood that the invention is not limited to such an application.

The exact feeding and accurate dosage of portions discharged by a feeder of dressing agents and pulverulent dressing agents is a fundamental primary requirement of this type of apparatus.

There are already known apparatuses for the accurate measurement of feeding rates. The essential feature of these apparatuses is that a vessel for catching pulverulent dressing agents is placed between the feeder and the dressing space for the purpose of sampling. The sample obtained is weighed on a scale and the output of the feeder is calculated from the reading of the weight and the sampling time. The drawback of this solution is that it does not ensure continuous measuring of the quantity discharged by the feeder, the stream of the pulverulent dressing agent towards and into the dressing space is interrupted during the time necessary to carry out the sampling and seeds are fed from the dressing apparatus without being dressed. A further disadvantage of this solution is that it is impossible to detect a deviation of the quantity discharged from the set value. This means that either insufficient or overdressing may occur.

The essential feature of another known measuring apparatus for pulverulent dressing agents is that a displaceable counterweight is placed on one arm of a beam and scales while the other arm is provided with a pan into which the pulverulent dressing is falling. When the weight of the discharged quantity of pulverulent dressing agent generates a torque sufficient to tip the scale, the pulverulent dressing material falls into the dressing space. The desired quantity can be set by displacement of the counterweight. The drawback of this solution is that the measuring is intermittent and therefore cannot be applied with continuously operating machines. Besides, in the case of sticky pulverulent dressing agents, usually a certain quantity remains adhered to the pan thus causing uncontrolled variations in the quantity discharged by the feeder.

The aim of the invention is to eliminate these drawbacks and to provide a continuously measuring apparatus producing accurate measurement.

The invention is based on the recognition that its aim can be achieved if a signal is transmitted through the stream of the medium forming a curtain of medium to be measured and the variation in the intensity of the signal is measured continuously.

According to the invention this problem is solved by an apparatus wherein at least two opposed windows are formed in the wall of a guide element for the medium and a signal emitter and a signal receiver are arranged outside the guide element free from the stream of the medium facing the stream of the medium.

In a preferred embodiment the guide-element of the medium is formed by a tube.

In another expedient embodiment of the invention the accurate and continuous measuring is attained by arranging the signal emitter and/or signal receiver in a chamber fitted to the side of the guide element of the medium which is free from the stream of medium.

In a further advantageous embodiment, the signal receiver is linked to an indicating instrument indicating the numerical readings of the weights of the feedings.

In a further favourable embodiment, the continuous adjustment of the rate of feeding is automatically regulated in that the control of the feeder forming the curtain or stream of the dressing agent is operated in accordance with the indication given by the signal receiver.

The invention is further described purely by way of an example with reference to a preferred embodiment illustrated in the accompanying drawings, wherein:

Figure 1 shows a diagrammatic layout of the apparatus according to the invention;

Figure 2 shows a schematic illustration of the automatic control system of the apparatus according to the invention.

As illustrated in Figure 1, a guide element 1 is formed by a tube placed under a feeder 10 providing a stream of medium. Two apertures 13, 14 are arranged in the wall of the guide element 1 opposite each other. Outside the tube forming the guide element 1, a signal emitter 2 and a signal receiver 3 are arranged in such way that a signal emitted by the emitter can pass through apertures 13, 14 and be received by the receiver. In this particular embodiment the signal emitter 2 is a light source and the signal receiver 3 is a photoconductive cell. The signal emitter 2 and the signal receiver 3 are arranged in a chamber indicated by the reference numerals 5 and 6 and an overpressure is generated in the chamber on the side of the apertures 13, 14 remote from the stream of medium.

Due to the overpressure, the materials being fed will not deposit either on the signal emitter 2 nor on signal receiver 3 and thus apertures 13, 14 remain fully open and free from the material being fed. Chamber 5, 6 is connected via pipe line 12 to an air compressor 7 required for supplying the air for the overpressure but this of course can also be provided by using compressed air cylinders (bottles). It is also possible to employ another gaseous or liquid medium for producing the overpressure.

The signal emitter 2 is connected with a current supply unit and the signal receiver 3 is connected via amplifier 8 to an indicating instrument 9 which may provide acoustic, digital etc. indicator signals or symbols. The indicator instrument 9 indicates the measured values obtained within given ranges. Figure 2 illustrates the automatic adjustment of the setting of the apparatus according to the invention. In this particular embodiment the amplifier 8 of signal receiver 3 is connected not only to the indicating instrument 9 but also conveys the signal 17 of the measured value to an evaluating unit 15 into which also a base or comparison signal 16 is introduced. The evaluation unit 15 emits a control-regulating signal 18 to a control-regulator apparatus 19 which by means of a correspondingly generated signal 20 controls the output of the feeder 10.

This embodiment ensures the stable, reliable operation of the feeder 10 creating the curtain of medium.

CLAIMS

1. Apparatus for the continuous measuring of feed rates of liquids and particulate materials, the apparatus comprising a feeder creating a curtain of medium to be measured, a guide element having at least two opposed apertures in the walls thereof, a signal emitter and a signal receiver arranged behind apertures on the outer side of the guide element remote from the stream of medium and means for generating a pressure on the said side that, in operation, is higher than that on the other side of guide element facing the stream of medium.

2. Apparatus according to Claim 1 wherein the guide elememt of the medium is formed by a tube.

3. Apparatus according to Claims 1 or 2, wherein the signal emitter and/or signal receiver is or are arranged in a chamber located on the side of the guide element of medium remote from the stream of medium.

4. Apparatus according to any of Claims 1 to 3, wherein the signal receiver is connected to an indicating instrument.

5. Apparatus according to any of Claims 1 to 3 wherein the arrangement is such that regulation of the feeder is carried out in accordance with the magnitude of the signal detected by the signal receiver.

6. An apparatus for measuring the feed rate of a medium dispensed by a feeder, the apparatus comprising a guide element for conducting the flow of medium, means for emitting and detecting a signal across the flow of medium in the guide element wherein the wall of the guide element has at least two opposed signal-transmitting areas for transmitting a signal from the emitting means.

7. An apparatus substantially as hereinbefore described with reference to and as shown in Figure 1 or Figure 2.

8. A seed dressing machine comprising an apparatus as claimed in any one of claims 1 to 7.

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